

MULTIPLE-ANTENNA PARTIALLY COHERENT CONSTELLATIONS FOR
MULTI-CARRIER SYSTEMS

ABSTRACT:

- 5 A multi-level space time signal constellation that is optimized for use with a multi-carrier, multi-path communication scheme includes points on a first level separated from points on a mutually exclusive second level by a minimum distance that is based on a conditional probability distribution, preferably a Kullback-Leibler (KL) distance. Points within one level may be separated by a Euclidean distance, but spherical levels are rotated relative to one
10 another to maximize a minimum inter-level KL distance. A receiver uses pilot symbols to estimate the channels and two-stage symbol detection, determining in one stage the constellation level and in another stage the point in the level. The receiver calculates a likelihood function based on a conditional distribution which does not reduce to the Euclidean-based nearest-neighbor detector. A single stored constellation may be scaled based
15 on received signal to noise ratio. Each constellation defines $n=2M$ real dimensions, wherein M is the number of transmit antennas.